

Chico

**Golden  
Empire  
Amateur  
Radio  
Society, Inc.**

www.gearsw6rhc.org

"Dedicated to Public Service"

# THE RADIATOR

W6RHC  
IRLP #8170

P.O.Box 202 Chico, CA 95927

August 2022 Newsletter

GEARS Founded August 13, 1939

From the President.....

Here we are in the long, slow, lazy, hot days of August. Becki, Emmi and I are currently in Trukee, CA enjoying some relief from the Summer heat of Chico. With our close friends Mark and Debbie from Palmdale, CA, we are enjoying the camping life. Floating the Truckee River in Kayaks, and bicycling the many trails in this area are few of the activities we are enjoying, of course I spend a lot of time in my chair enjoying just watching. We feel so blessed and are thankful for the opportunity. We will return to Chico the Middle of next week surly searching for another excuse to get to the cool of the mountains or the ocean.

According to Jim Jennings W7XZ President of OARS, OARS will be hosting the annual Steak Bake this year. The activities will be held at Hammond Park in Oroville on September 10th. There are lots of activities planned, and of course with lots of activities there is need for volunteers. Details coming soon. This is a great activity and fun time for radio talk or whatever talk you choose with like minded individuals. This is a great way the different clubs can come together and support each other.



Something I learned recently, may be true or maybe not true, but the reason CQ is the calling nomenclature for HAM radio is not necessarily the initials but the sound the two letters make when they are stated together, ceeek qyou. So am I just full of dumb thoughts or could this be true? Maybe some of you more seasoned or more experienced HAM'S could shed some light on this subject during the next NET, which of course is next Tuesday, 7:30 pm.

Don't forget breakfast Saturday August 13, 9:00am at the Farmer's Skillet. Then on MONDAY AUGUST 22 our second meeting at the Chico LIBRARY, time 6:00pm Social Hour and Meeting time 7:00pm.

We are especially thankful to Rich Astley, N3UOR. Rich came to our rescue when we were in need of a meeting location and volunteered his shop. THANK YOU RICH.

Stay cool, drink lots of water and enjoy the remainder of Summer. '73

Paul Stewart N6PAS  
[n6pas1@gmail.com](mailto:n6pas1@gmail.com)

## August 2022 Calendar

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4 7:30pm Simplex Net	5	6
7 2pm VEC Testing Chico 8pm OARS Net	8 7pm GARS Net 8pm ARES Net	9 7pm PARS Net 7:30pm GEARS Net	10	11 7:30pm Simplex Net	12 7pm OARS meeting 7pm GARS meeting	13 9am Chico Breakfast
14 8pm OARS Net	15 7pm GARS Net 8pm ARES Net	16 7pm PARS Net 7:30pm GEARS Net	17	18 7:30pm Simplex Net	19 6pm GEARS Meeting	20
21 8pm OARS Net	22 6pm GEARS Meeting 7pm GARS Net 8pm ARES Net	23 7pm PARS Net 7:30pm GEARS Net	24	25 7:30pm Simplex Net	26	27 9am OARS Breakfast
28 8pm OARS Net	29 7pm GARS Net 8pm ARES Net	30 7pm PARS Net 7:30pm GEARS Net	31			

**VEC Testing**, FCC License Exam available by appointment. 2pm Chico Elks Lodge. For information or registration call Tom Rider, W6JS 530-514-9211

**Chico Breakfast** 2nd Saturday 9am Farmers Skillet Cohasset Rd, Chico

**GEARS** Board Meeting 1st Monday 7pm by zoom.

**PARS Meeting** 2nd Thursday 6:30pm, doors open 6pm Old Magalia Community Resource Center

**OARS Meeting** Second Friday of the month, St. Pauls Episcopal Church Hall, Oroville.

**GARS Meeting** Second Friday of the month, Lutheran Church Hall, Artois.

**Butte ARES Meeting** 3rd Tuesday, TBD Contact Dale Anderson, KK6EVX 826-3461

**GEARS Meeting, August 22** Doors open 6pm, meeting 7pm at Chico Public Library, 1108 Sherman Ave, Chico

**OARS Breakfast** 4th Saturday of the month, at Cornucopia of Oroville.

### NETS:

OARS Club Net Sunday 8pm 146.655 Mhz - PL 136.5

GARS Club Net Monday, 7:00 pm 147.105 MHz + PL 110.09, secondary: 146.850 MHz-PL 110.9

Butte ARES Net Mondays 8pm 145.290 MHz - PL 110.9

Yuba Sutter Club Net Monday 7pm 146.085 MHz + PL 127.3

GEARS Club Net Tuesdays 7:30 PM 146.850 MHz - PL 110.9

PARS Club Net Tuesday 7pm 145.290 - PL 110.9

Simplex Net Thursday 7:30 p.m. 146.52 no tone

Yuba Sutter ARES Net Thursdays 7pm 146.085 MHz + PL 127.3

Sacramento Valley Traffic Net Nightly 9:00 PM 146.850 MHz - PL 110.9

# QSL Cards

By Jim Matthews K6EST

I was recently contacted by Bonnie Burnham who wanted to make a donation to GEARS. She gave us a generous cash gift as well as a box of QSL cards collected by her father Bill Goddard W6AKQ. Bill was a GEARS member in the '80s and '90s.

He was a very interesting and accomplished man. Bill was an engineer who taught at Occidental College for the Navy V12 training program. He later worked for IBM and was the co-inventors of the computer hard disk drive. Bill also had an article published in the January 1947 edition of CQ Magazine. He and his wife Nancy moved to Chico in 1986 and lived here until his death in 1997.

Bill's QSL cards date back to 1930 and confirm contacts from all over the world. While many hams still send QSL cards, they are not nearly as widely used as in the pre-internet days. Nonetheless, they are still fun to send and collect.

I'll bring some of his cards to the next GEARS meeting on August 22 at the Chico Public Library. I also have a QSL card from one of the GEARS founders Nola Dixon W6RHC.

You can read more about Bill in the inventors Hall of Fame <https://www.invent.org/inductees/william-goddard>

[https://en.wikipedia.org/wiki/William\\_Goddard\\_\(engineer\)](https://en.wikipedia.org/wiki/William_Goddard_(engineer))



# Feeding End-Fed Antennas

By Ward Silver, NOAX

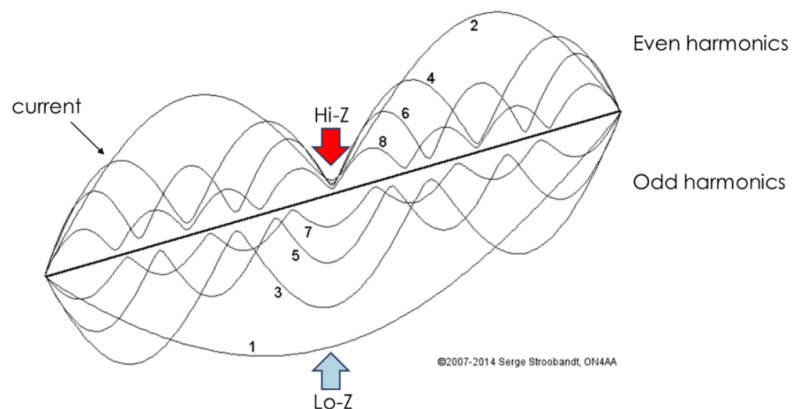
“End-fed” antennas, in particular the “End-Fed Half-Wave” (EFHW), are all the rage these days, particularly for portable operation. Throw a string over a tree branch, haul up one end, connect the other end to the matching transformer and—voila!—you’re on the air on multiple bands. And they do work pretty well. What’s the secret?

## Voltage-Fed, End-Fed, or Both?

Let’s revisit an old term. What we call “end-fed” was long referred to as “voltage-fed,” meaning the feed point is located at a high-voltage/low-current point on the antenna. Remembering that impedance is the ratio of voltage to current, that point is also a high-impedance point. Since current is going to be pretty low at the end of the antenna—where would it go?—the end will be a high-impedance point, no matter what frequency.

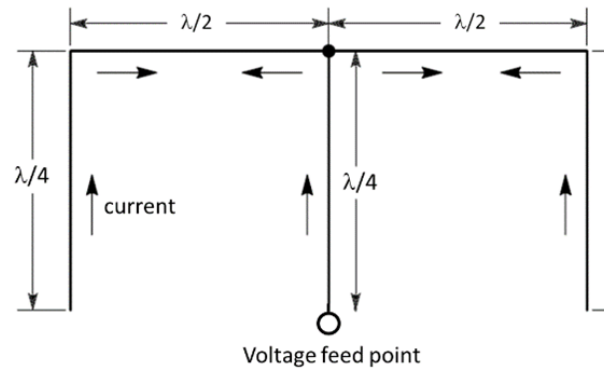
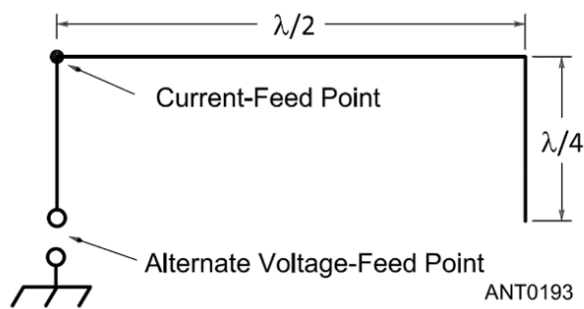
The feed point doesn’t have to be at the end to have a high impedance. For example, on its second harmonic, the familiar dipole becomes voltage-fed. [Serge, ON4AA](#), made a very good, if complicated, drawing showing the current on a dipole for its fundamental and several harmonics. You can see that on the even harmonics, a center feed point is always high impedance, and on the odd harmonics, it is a low-impedance point. But...the one point where the impedance is always high is the end.

There are lots of voltage— or end-fed antennas. The classic Zepp (named after the Zeppelin airship on which it was used) is a half-wave dipole fed at one end. The popular J-pole is also an end-fed antenna—a Zepp with the half-wave radiating element sticking straight up instead of being horizontal.



Here are two nice drawings from Owen, VK1OD, that show how a Zepp (top) and J-pole (bottom) are really the same antenna! (Would that make them a Zepp-pole-in?)





## Voltage Feeding

So how do you “voltage-feed” an end-fed antenna? You might just hook up the coax and use your antenna tuner. Unfortunately, the SWR from the high impedance load would result in a lot of loss in the coax! You need to transform the high feed point impedance down to something closer to 50  $\Omega$ . There are three common ways to do that:

## Tuned Feeders

The Zepp and J-pole use the “tuned feeders” approach. A quarter-wavelength transmission line attached to a high impedance on one end will present a low impedance on the other. That’s how the Zepp was originally fed. The J-pole shorts one end of its “feeder” so that the other end will have a high impedance. Somewhere between the short and the antenna, there will be a point at which the impedance is close to 50  $\Omega$ , and that’s where you attach the feed line as shown above. You can apply this method to any voltage-fed antenna, but it will only work at one frequency. It’s not a multi-band solution.

## Parallel LC Circuit

Another single-frequency or “resonant” approach is to use a parallel tuned circuit as shown below. The circuit is first tuned to resonance with the antenna attached. The parallel-resonant circuit presents a high impedance at the feed point. Then the coax to the transmitter is attached to the coil with a movable tap and the tap position adjusted for the best match.

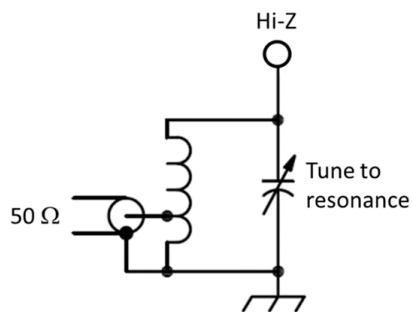
The tuned circuit acts a lot like the quarter-wavelength transmission line, doesn’t it? One end is at a low impedance (with respect to ground) and the other is at a high impedance. (There are many parallels between tuned LC circuits and transmission lines.) If you use this method at 100  $\Omega$  or more, be wary of the high voltages that are developed at the feed point! The variable capacitor must also

withstand these voltages. Typical values for L and C are 15  $\mu$ H and 75–150 pF for low-band operation. This is a narrowband matching network with typical 2:1 SWR bandwidths of less than 100 kHz.

## Impedance Transformer

A solution that works over several bands is to use a broadband impedance matching transformer. This is the usual matching scheme for the popular EFHW antennas. The transformer's impedance transformation ratio is the square of the turns ratio. As shown here, the turns ratio is 7:1 so the impedance ratio is 49:1

and type #43 ferrite will work over the entire HF range of 80–10 meters. The 150 pF capacitor compensates for winding inductance so the impedance ratio remains stable above 15 meters on the 24 and 28 MHz bands.



## Why 49:1?

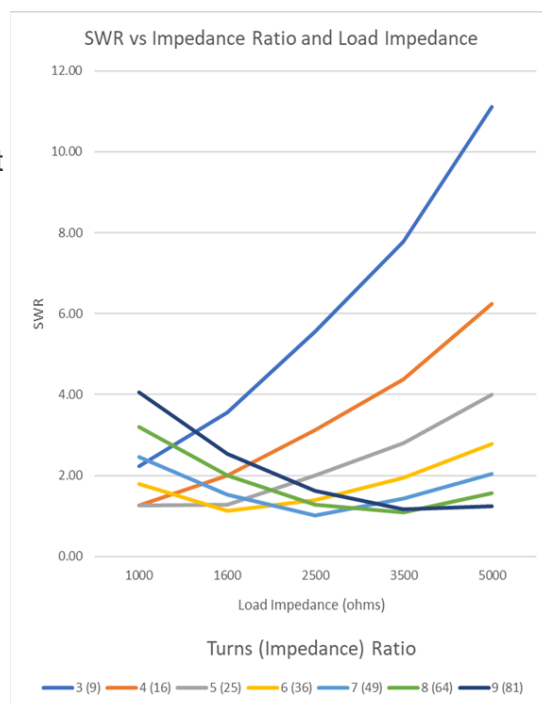
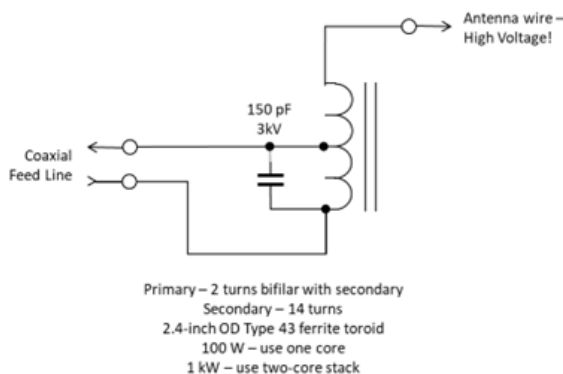
When researching the EFHW and random-wire antennas, you will find transformers recommended with impedance ratios of 9:1 (turns ratio of 3:1) to 64:1 (turns ratio of 8:1). To pick the right turns ratio, you need to know the antenna feed point impedance.

Most end-fed antennas will have a feed point

impedance of 1000 to 5000  $\Omega$ . It's actually pretty difficult to create impedances above 5000  $\Omega$  at RF because of stray capacitance and coupling to nearby conductive objects. The graph below looks at the transformer's primary impedance with several different feed point impedances and turns ratios.

The “best” ratio would be the one that keeps the impedance at the coaxial cable connection close to 50  $\Omega$  over a wide range of feed point impedances.

Beginning with the 9:1 transformer, you can see that it would make a good match below 1000  $\Omega$  (SWR would be 1:1 at 450  $\Omega$ ) but as the impedance rises, so does the SWR. (The same is true for ratios of 16 and 25:1.) If you use a 9:1 transformer at these high load impedances, beware—losses in the cable will partially mask the high SWR at the feed point.



Gradually increasing the turns ratio, you can see that a turns ratio of 6, 7, or 8 all produce reasonably low SWR across the expected range of feed point impedances.

The 49:1 transformer with a turns ratio of 7 (2 primary turns and 14 secondary turns) has an SWR below 3:1 for all of our feed point impedances, the lowest minimum SWR (1.02:1) and the lowest average SWR (1.69:1).

This is the transformer used in many commercial EFHW antennas, kits, and homemade antennas. If you do build this yourself, read and understand the presentation by K1RF first. A high-voltage ceramic capacitor should be used, even if you intend to operate at QRP levels. These capacitors are low-loss and relatively temperature stable.

The transformer can be used on most end- or voltage-fed antennas and would be a valuable addition to your antenna design gear. You should also have some non-inductive resistors (metal oxide or carbon composition) of various values to check the transformer at different load values. An antenna analyzer can measure the match across several bands.

## GEARS Century Members

Dale Anderson, Kathy & Michael Favor  
Kent Hastings, Bennett Laskey, Jim Van Sickle  
*We thank these members for their extra support.*

### GEARS Officers:

President.....Paul Stewart, N6PAS  
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Or by mail to:  
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Your dues and contributions support our local repeaters, ARES, and outreach events to keep amateur radio alive in our area. GEARS also makes donations to support other local repeaters.

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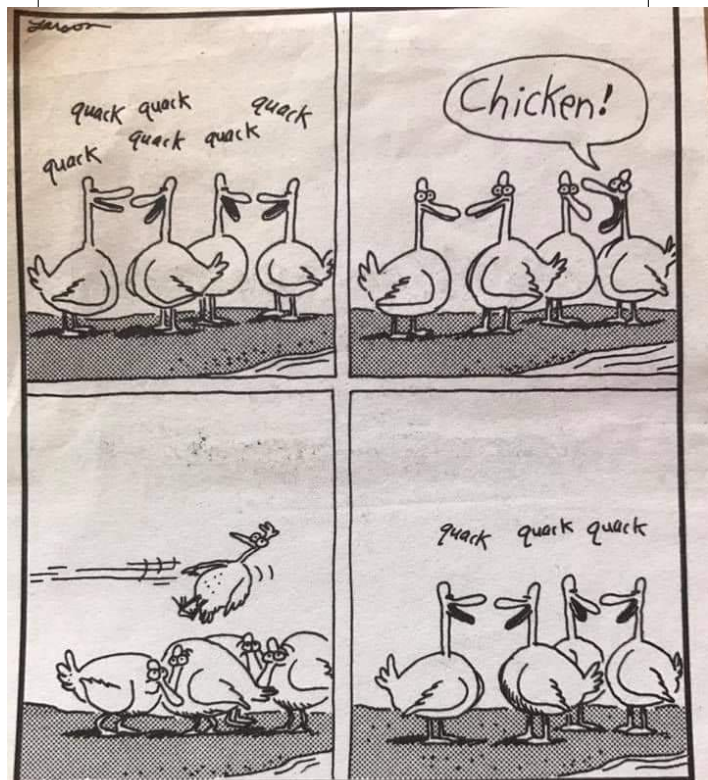
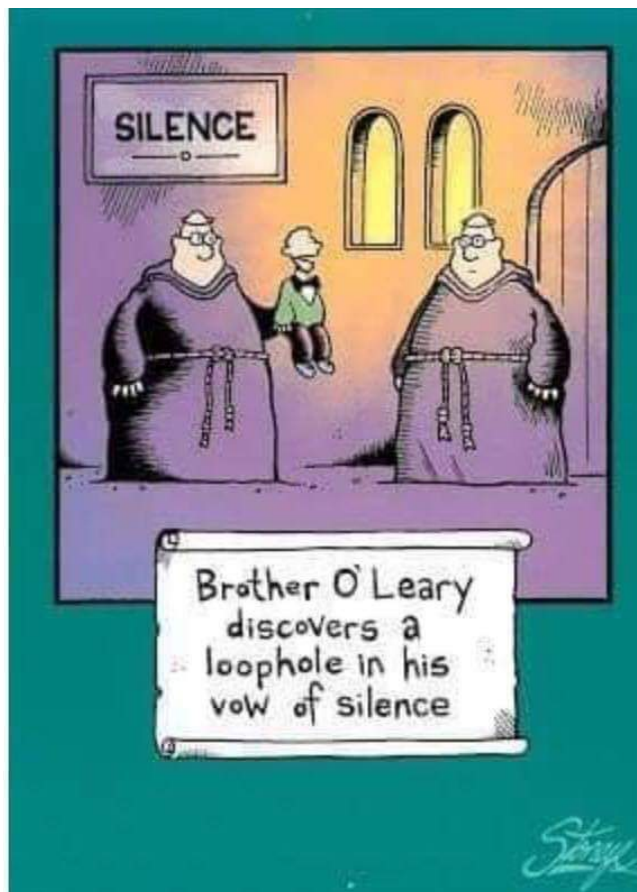
GEARS Newsletter edited by Jim Matthews  
K6EST  
[JiminChico@yahoo.com](mailto:JiminChico@yahoo.com)



In general, I don't believe in child labor. But sometimes they're the only ones who can figure out what's wrong with my computer.



While we were studying the rats, they were studying us. And, unlike ours, their study got published.



"And so," the interviewer asked, "do you ever have trouble coming up with ideas?"  
"Well, sometimes," the cartoonist replied.